QUARTERLY REPORT

(for July - September 1992)

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OCEAN OBSERVATIONS WITH EOS/MODIS: Algorithm Development and Post Launch Studies

by

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Following the format of my monthly reports, I shall describe developments (if any) in each of the major task categories.

1. Atmospheric Correction Algorithm Development.

a. Near-term Objectives:

(i) To use aerosol models to study the spectral variation in the single-scattered aerosol reflectances.

(ii) To learn how to extrapolate the single-scattered aerosol reflectances from the ocean NIR bands into the visible

(iii) To find an efficient scheme for including surface roughness generated by wind in a Monte Carlo model of radiative transfer in spherical shell atmospheres.

b. Task Progress:

(i) During this quarter we have continued our effort to quantify the spectral variation of the single-scattered aerosol reflectance for the realistic aerosol models that were developed for the LOWTRAN-6 code. Our approach has been to use the phase functions (near the MODIS spectral bands) based on the aerosol models. We have found that the atmospheric correction parameters [e(L,865), which are defined as the ratio of the single scattered aerosol reflectance at a wavelength L to that at 865 nm] cannot be extrapolated to L = 412 nm in a simple manner from the values at L = 765 and 865 nm.

(ii) We have tried to develop an extrapolation procedure based on the LOWTRAN aerosol models. The basic idea is to determine which aerosol models are appropriate by finding those that most closely bracket the observed e(765,865) value. The hypothesis is that aerosols with similar values of e(765,865) will have similar e(L,865) spectra. From our computations thus far, it appears that this is at least qualitatively true; however, we have not exhausted the range of the LOWTRAN models.

(iii) An efficient scheme for including surface roughness generated by wind in a Monte Carlo model of radiative transfer in spherical shell atmospheres has been developed. It is validated by showing that it provides radiances what agree with those produced by a Monte Carlo code for a plane parallel atmosphere when the radius of the spherical shell becomes very large.

c. Anticipated Activities During the Next Quarter:

(i) Extend computations to the full range of LOWTRAN aerosol models, i.e., maritime, rural, and urban, as well as combinations of these.

(ii) Use computations in (i) to further test the hypothesis that aerosols with similar values of e(L,865) will have similar e(L,865) spectra. Study how to incorporate this idea into an atmospheric correction algorithm, and begin to test the viability of such an algorithm for application to MODIS.

(iii) Begin to used the Monte Carlo model of radiative transfer in spherical shell atmospheres to study in detail the influence of the curvature of the earth on atmospheric correction. This study will begin with the basic CZCS algorithm and later be applied to new algorithms as they are developed.

2. Whitecap Correction Algorithm.

a. Near-term Objectives: Obtain some measurement of whitecaps at sea.

b. Task Progress: Frank Hoge has mounted the Xybion CCD camera, that we plan to obtain for our whitecap study on the P-3 aircraft, to obtain whitecap imagery during a flight from the West Coast to Hawaii.

c. Anticipated Activities During the Next Quarter: Obtain sample data from Frank Hoge for evaluation.

3. In-water Radiance Distribution Schedule.

a. Near-term Objectives: Obtain measurements near MODIS bands during the Monterey Bay cruise in Aug.-Sept.

b. Task Progress: The redesigned radiance distribution camera was tested at Lake Pend Oreille Idaho. Although data was acquired, subsequent analysis suggested that the cameras were not performing properly. This problem is being investigated. It was decided not to try to operate the cameras during Dennis Clark's cruise in Monterey Bay in late August and early September.

c. Anticipated Activities During the Next Quarter: Resolve camera problems.

4. Residual Instrument Polarization.

a. Near-term Objectives: None.

b. Task Progress: None.

c. Anticipated Activities During the Next Quarter: None.

5. Direct Sun Glint Correction.

a. Near-term Objectives: None.

b. Task Progress: None.

c. Anticipated Activities During the Next Quarter: None.

6. Prelaunch Atmospheric Correction Validation Schedule.

a. Near-term Objectives: Modify sky radiance camera for MODIS spectral bands. Learn how to invert sky radiance to obtain aerosol optical properties.

b. Task Progress: Camera has been modified and data of Sky radiance and aerosol optical thickness have been obtained during the Monterey Bay cruise.

c. Anticipated Activities During the Next Quarter: Preliminary analysis of the data using a radiative transfer code to extract the aerosol phase function and single scattering albedo.

d. Publications: A manuscript ``Retrieval of the Columnar Aerosol Phase Function and Single Scattering Albedo from Sky Radiance over the Ocean: Simulations,'' by M. Wang and H.R. Gordon, has been accepted for publication in Applied Optics. It describes a possible scheme for inverting sky radiance measurements to obtain aerosol properties referred to in (c) above. The reported work received partial support from the project

7. Detached Coccolith Algorithm and Post Launch Studies.

a. Near-term Objectives: None.

b. Task Progress: None.

c. Anticipated Activities During the Next Quarter: None.

8. Post Launch Vicarious Calibration/Initialization.

a. Near-term Objectives: None.

b. Task Progress: None.

c. Anticipated Activities During the Next Quarter: None.

9. Single Scattered Aerosol Radiance and PAR Algorithms.

a. Near-term Objectives: None.

b. Task Progress: None.

c. Anticipated Activities During the Next Quarter: None.

OTHER DEVELOPMENTS

None.